RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Borehole 51-06-02

Log Event A

Borehole Information

Farm : TX	**Tank :** TX-106	**Site Number :** 299-W15-148
N-Coord : 41,785	**W-Coord :** 75,819	**TOC Elevation :** 672.59
Water Level, ft :	**Date Drilled :** 6/30/1971	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	

Borehole Notes:
The drilling of this borehole was initiated in June 1971 with a 13-ft length of surface casing of unknown diameter. The borehole was driven to a depth of 100.5 ft using 6-in. casing and completed to a nominal total depth of 100 ft. The drilling log does not mention if the casing was perforated or grouted. Total logging depth achieved by the SGLS was 100 ft.

The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

The zero reference for the SGLS logs is the top of the borehole casing. The top of the casing sticks up about 4 in. above the ground surface and is enclosed in a concrete collar.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 11/1995	**Calibration Reference :** GJPO-HAN-3	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 2/2/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 100.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 22.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 2/6/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 23.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Analysis Information

Analyst : H.D. Mac Lean

Data Processing Reference : P-GJPO-1787 Analysis Date : 12/3/1996

Analysis Notes :

This borehole was logged by the SGLS in two logging runs. The pre-survey field verification spectra for log run one failed to meet the acceptance criteria established for the peak shape and system efficiency. A nonconformance report issued in August 1996 (N-96-05) identified the cause of this failure as a power supply malfunction that resulted in a low detector bias voltage being supplied to the logging tool. This malfunction occurred in the mornings because of insufficient system warm-up time. The nonconformance report also documents that radionuclide concentrations calculated from data collected in the first 2 hours of the logging operation could be systematically understated by about 10 percent. Data from log run two will be unaffected, but data from log run one may show a repeatability problem if the borehole is re-logged in the future.

The post-survey field verification spectra for all the logging runs passed the acceptance criteria for the peak shape and system efficiency, indicating that the logging system was operating within specifications after an initial warm-up period. The energy calibration and peak-shape calibration from the post-survey field verification spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during logging. Gain drift during logging was slight. It was not necessary to adjust the energy calibration to maintain proper peak identification while processing the data from the logging spectra.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

A depth overlap, where data were collected by separate runs at the same depth, occurred in this borehole between depths of 22 and 23 ft. The concentrations of Cs-137 and the naturally occurring gamma-ray-emitting radionuclides were calculated using the separate data sets at the overlapping depth points. The measured concentrations of these radionuclides were within the statistical uncertainty of the measurements, indicating very good repeatability of results from the logging activity.

Cs-137 was the only man-made gamma-ray-emitting radionuclide encountered in this borehole. Cs-137 contamination was detected almost continuously from the ground surface to a depth of 29.5 ft. Detectable quantities of the contaminant were also encountered at 32, 33, 39.5 ft, and at the bottom of the borehole. A zone of relatively higher Cs-137 contamination of about 3 pCi/g was detected between 0.5 and 4 ft. The highest measured Cs-137 concentration was about 9 pCi/g at the ground surface. Measured Cs-137 concentrations between 4.5 and 29.5 ft were less than 1 pCi/g. Except for the bottom of the borehole, measured concentrations below 30 ft ranged from 0.2 to 0.3 pCi/g. The measured concentration at the bottom of the borehole was about 1 pCi/g.

The logs of the naturally occurring radionuclides show a slight increase in the K-40 and Th-232 concentrations at a depth of about 50 ft. A second increase in the K-40 concentration was detected between 60 and 80 ft.

There is a pronounced decrease in the SGLS total count rate between depths of 83 and 98 ft. A slight peak in the SGLS total count-rate activity occurs at a depth of about 94 ft.

Details regarding the interpretation of the data for this borehole are presented in the Tank Summary Data Report for tank TX-106.

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Log Plot Notes:

Separate log plots show the man-made (Cs-137) and naturally occurring (KUT) radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, in addition to the total gamma derived from the spectral data and the Tank Farm gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.